

ENGAGING STUDENTS WITH SUBJECT MATTER EXPERTS AND SCIENCE CONTENT THROUGH CLASSROOM CONNECTION WEBINARS. P.V. Graff¹, E. Rampe², W. L. Stefanov³, L. Vanderbloemen¹, M. Higgins¹, ¹Jacobs @ NASA Johnson Space Center, Houston, TX, 77058, (paige.v.graff@nasa.gov), ²Aerodyne – Jacobs JETS Contract, NASA JSC, ³NASA JSC.

Introduction: Connecting students and teachers in classrooms with science, technology, engineering, and mathematics (STEM) experts provides an invaluable opportunity. Subject matter experts can share exciting science and science-related events as well as help to “translate” science being conducted by professionals. The Expedition Earth and Beyond (EEAB) Program [1], facilitated by the Astromaterials Research and Exploration Science (ARES) Division at the NASA Johnson Space Center, has been providing virtual access to subject matter experts through classroom connection webinars for the last five years. Each year, the reach of these events has grown considerably, especially over the last nine months. These virtual connections not only help engage students with role models, but are also designed to help teachers address concepts and content standards they are required to teach. These events also enable scientists and subject matter experts to help “translate” current science in an engaging and understandable manner while actively involving classrooms in the journey of science and exploration.

Expedition Earth and Beyond (EEAB): This Earth and planetary science education program is designed to inspire, engage, and educate teachers and students by getting them actively involved with NASA exploration, discovery, and the process of science. The program provides a structure for students in grades 5-12 to conduct authentic research about Earth and/or other planetary bodies. At least once a quarter, the program provides the opportunity for students to engage and interact with scientists and STEM experts through classroom connection webinars.

Classroom Connection Webinars: These online distance learning events are designed to connect students and teachers across the nation with subject matter experts. Events are facilitated through the use of WebEx, a web-based collaborative tool. Technical requirements are minimal -- an internet-connected computer and a speaker phone. As an alternative to a speakerphone, participants have also utilized SKYPE or Google Voice. WebEx can easily connect distributed participants and allow them to be actively engaged as they interact with subject matter experts during webinar events.

Each webinar event, depending on presenter availability, is scheduled twice during a given week to accommodate the schedules of teachers across the nation and across time zones. Sessions are scheduled for one

hour, however, the subject matter expert remains on the line for up to an additional thirty minutes to accommodate additional questions student groups may have. To ensure events capture and keep the attention of the participants, presentations utilize a variety of engaging media. This includes image-intensive slides with little text, video clips, and questions for participants to interact with the presenter.

Sessions begin with introductory information including the purpose of the webinar before turning the controls over to the STEM expert. Before the main presentation begins, STEM experts introduce themselves providing students with insight into their career path. Once the presentation begins, the subject matter expert not only shares their knowledge and science content, but involves participants as well. The interactive nature of the presentation enables classrooms to answer questions posed by the presenter and share their observations. This enables the presenter to gain insight into the prior knowledge of the participants or simply allows participants to share their understanding of content being shared. Questions posed often include thought-provoking scenarios that ask students to apply similar concepts scientists take into consideration when conducting their research. This enables participants to gain experience in “scientific thinking.” Participants are acknowledged as they contribute feedback using the chat window.

Webinar topics generally focus on a broad range of themes such as remote sensing, comparative planetology, and planetary exploration. Topics are often chosen based on subject matter expert areas of expertise, current and exciting events (such as Earth Day or mission milestones), and mission updates, to name a few. Topics and content are also geared to help teachers address standards they must teach in the classroom as well. The Next Generation Science Standards guide today’s educators, and are designed to reflect a new vision for science education. They aim to reflect the interconnected nature of science as it is practiced and experienced in the real world [2]. “The framework is designed to help realize a vision for education in the sciences and engineering in which students, over multiple years of school, actively engage in scientific and engineering practices and apply crosscutting concepts to deepen their understanding of the core ideas in these fields” [3]. This integration of knowledge and practice is what practicing scientists (and engineers) do on a daily basis. What better way to model this than engag-

ing students with subject matter experts and having them practice these same skills? These webinars provide students with an authentic means in which to experience scientific practices through current scientific research shared by STEM experts.

Recent Classroom Connection Webinars: Six EEAB classroom connection webinar events facilitated from March through December 2014 engaged approximately 4000 students and teachers during “live” events. Thousands of additional students were reached through event archives. Events focused on work being facilitated from the International Space Station, updates on the Mars Science Laboratory mission, and comparative planetology. Participation in each of these events ranged from ~500 live participants to over 1000 live participants. The reach of these events has exceeded participation from previous years’ events and has extended our reach of participants beyond our expectations. The continual growth of these events has demonstrated an increase in interest in connecting and engaging students with subject matter experts.

Subject matter experts that participated in these latest six events included Dr. Elizabeth Rampe, Mars Science Laboratory science team member; Dr. William Stefanov, International Space Station Program Associate Scientist for Earth Observations; Dr. Lisa Vanderbloemen, oceanographer and manager of the International Space Station (ISS) Earth Science Remote Sensing (ESRS) Unit at NASA JSC; Melissa Higgins, meteorologist and earth scientist in the ISS ESRS Unit at NASA JSC; and Paige Graff, educational professional and Expedition Earth and Beyond program lead. The diversity of expertise of each subject matter expert and exposure of these experts to classrooms nationwide enable students to see a range of STEM experts as well as experience the different personalities and presentation styles of each guest speaker.

Feedback gathered from the events in addition to repeat participation by classroom teachers has indicated that teachers find these connections exciting, inspiring, motivating, and extremely valuable. This is confirmed by comments such as “*These experiences motivate our students, promote their curiosity, and help them understand the bigger picture of science,*” and “*We thoroughly enjoyed this experience. The opportunity to engage with a real scientist working in such a thrilling capacity is immeasurable.*” Teachers have also indicated that these events help them address content standards they need to teach. As both students and teachers continually ask for more webinars, this reveals the overall success and interest in these types of connections.

Conclusions: Engaging students and teachers with subject matter experts enables the excitement and story

of science and exploration to come to life in classrooms across the nation. These virtual events capture participants’ attention while increasing their science awareness, giving them access to subject matter experts, and reinforcing Next Generation Science Standard concepts. Classrooms no longer have to simply read about science in a textbook or from the internet; webinars enable classrooms to interact with, engage in, and become part of the journey of science and exploration.

References: [1] *Expedition Earth and Beyond*, <http://ares.jsc.nasa.gov/ares/eeab/index.cfm>, [2] *Next Generation Science Standards* (2013) Appendix A, [3] The National Academies Press (2011) *A Framework for K-12 Science Education: Practices, crosscutting concepts, and core ideas* (p10).

Additional Information: For additional information on Expedition Earth and Beyond and classroom connection webinars, contact Paige Valderrama Graff at paige.v.graff@nasa.gov.